IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

Applicant	:	Eskicioglu
Serial No.	:	09/763,773
Filed	:	February 26, 2001
For	:	A COPY PROTECTION SYSTEM FOR HOME NETWORKS
Examiner	:	Wu, Allen S.
Art Unit	:	2135

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

May It Please The Honorable Board:

This is Appellants' Brief on Appeal from the final rejection of Claims 1 – 20. Appellants filed a Notice of Appeal on November 2, 2005. A petition for a four-month extension of time is filed herewith. Accordingly, this Appeal Brief is considered timely filed. Appellants waive an Oral Hearing for this appeal.

The Office is authorized to charge any fees due and owing, or credit any overpayment, to Deposit Account No. 07-0832. Enclosed is a single copy of this Brief.

I. REAL PARTY IN INTEREST

The real party in interest of Application Serial No. 09/763,773 is:

Thomson Licensing Inc.
Two Independence Way
P.O. Box 5312
Princeton, New Jersey, 08543

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to Mailstop Appeal Brief – Patents, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

April 4, 2006
Date

Lori Klewin
Lori Klewin

II. RELATED APPEALS AND INTERFERENCES

There are currently, and have been, no Appeals or Interferences regarding Application Serial No. 09/763,773 known to the undersigned attorney.

III. STATUS OF THE CLAIMS

Claims 1 – 20 stand rejected. Claims 12 – 20 have been cancelled, without prejudice, in an amendment filed contemporaneously herewith. A copy of this Amendment has been attached hereto as Appendix VI. Accordingly, the rejection of Claims 1-11 is appealed.

IV. STATUS OF AMENDMENTS

All prior amendments have been entered. The contemporaneously filed (attached) amendment is reflected in the claims included in Appendix I.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This summary sets forth exemplary reference characters, pages and line numbers in the specification. The identification of reference characters, pages and line numbers does not constitute a representation that any claim element is limited to the embodiment illustrated at the reference character or described in the referenced portion of the specification.

Independent Claim 1 recites a method for copying a program having a scrambled program content component and an encrypted control component. The method of Claim 1 first recites (a) receiving, in a recording apparatus, the program *(specification, page 6, line 39 – page 7, lines 2; Fig 1 (scrambled content), Fig. 2A (ECM))*. A data item is attached (b) to the encrypted control component, the data item indicating that the program has been copied *(specification, page 8, line 28 – page 9, line 2; Fig. 2B (Encrypted ECM + Data Item or Mark)*. The encrypted control component and the data item are encrypted (c) to

generate a nested control component *(specification, page 8, line 28 – page 9, line 2; Fig. 2B (Encrypted ECM + Data Item or Mark = Nested & Encrypted ECM))*. Finally, the program content component and the nested control component are recorded (d) *(specification, page 9, lines 1-2; Fig. 2B)*.

Dependent Claim 4 recites that the copy control information indicates one of a never-copy state and copy-once state *(specification, page 7, lines 2-3, page 8, line 39 – page 9, line 9)*. Claim 4 depends from Claim 3. Claim 3 recites that the steps of receiving, attaching and encrypting are performed in a smart card coupled to the recording apparatus (*specification, page 7, lines 25-26, page 8, lines 28-37*). Claim 3 depends from Claim 2. Claim 2 recites that the encrypted control component comprises copy control information, and a descrambling key associated with said scrambled program content component (*specification, page 8, lines 28-39).*

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Examiner has rejected Claim 1 as being unpatentble under 35 USC 103(a) over United States Patent 5,689,559 (Park '559) in view of United States Patent No. 5,796,826 (Park '826).

The Examiner has rejected Claims 2-7 as being unpatentable under 35 U.S.C. 103(a) over Park '559 in view of Park '826, and further in view of United States Patent 5,544,246 (Mandelbaum).

The Examiner has rejected Claims 8-11 as being unpatentable under 35 U.S.C. 103(a) over Park '559 in view of Park '826, further in view of Mandelbaum, and further in view of an EBU Project Group B/CA document (EBU).

VII. ARGUMENT

The cited prior art fails, in any combination, to render any of the pending claims unpatentably obvious under 35 U.S.C. 103(a).

I. Standard for Unpatentability Under 35 U.S.C. 103(a)

To establish a prima facie case of obviousness, all of the recited claim limitations must be taught or suggested in the prior art. *See, M.P.E.P. 706.02(j); see also, M.P.E.P. 2143.03 citing In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) ("All words in a claim must be considered in judging the patentability of that claim against the prior art.") and In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).*

As discussed below, the cited prior art references, both singly and in combination, fail to teach or suggest all of the limitations of Claims 1 – 11 – and hence fail to render any of the pending claims unpatentable as a matter of law.

II. 35 U.S.C. 103(a) Rejection of Claim 1

A. Claim 1 Recitation

Claim 1 is independent in form and recites:

> A method for copying a program having a scrambled program content component and an encrypted control component comprising:
> (a) receiving, in a recording apparatus, said program;
> (b) attaching a data item to said encrypted control component, said data item indicating that said program has been copied;
> (c) encrypting said encrypted control component and said data item to generate a nested control component; and
> (d) recording said program content component and said nested control component. (emphasis added)

Accordingly, Claim 1 broadly encompasses: (a) receiving a program having scrambled content and an encrypted control component; (b) attaching a data item indicating that the program has been copied to the encrypted control component; (c) encrypting the already encrypted control component and attached data item to generate a nested control

component; and (d) recording the program content and nested control component. The Park '559 and Park '826 patents, both singularly, and in combination, fail to teach or suggest at least the limitations of (1) attaching a data item to a received program's encrypted control component, the data item indicating that the program has been copied and (2) encrypting the encrypted control component and data item to generate a nested control component, no less the further step of recording said nested control component; and thus fail to render Claim 1 unpatentable.

The term "nest", means "to fit or place one within another", or "to fit together or within another or one another". *The Random House Dictionary of the English Language, page 960, definition of "nest" (copyright 1966, 1967).* A copy of this reference was submitted with Applicant's Response after Final Rejection. A copy has also been included in Appendix II hereof. Further, on-line technical definition of the term "nested" reveals "[i]n data structures, data organizations that are separately identifiable but also part of a larger data organization are said to be "nested" within the larger organization. A table within a table is a nested table. A list within a list is a nested list." *http://whatis.techtarget.com/definition.* A copy of this reference was also submitted with Applicant's Response after Final Rejection. A copy has also been included in Appendix II hereof.

The ordinary and customary definition and usage of the term "nest" or "nested" is consistent with Applicant's use of the term "nested". *See, e.g., specification page 8, lines 28-33 (every time a scrambled movie is copied, its ECMs are encrypted once again, a process that may be referred to as nesting").* This is further explained in the present specification at page 8, line 28 – page 9, line 2. Therein it teaches that if content is scrambled, the recorder encrypts the ECMs using the global public key. Before encryption takes place, the recorder attaches a mark (or data item) (see Figure 2b) to each ECM as an

indication of copying. This allows the smartcard to determine how many times the original movie has been copied.

The following example of a method for copying a program having a scrambled program content component and an encrypted control component is presented in the specification in page 28, line 39 – page 29, line 9. GPK is the Global public key, E is the Encryption process, CW is the Control word (the key for descrambling) and the ECM contains the CW, copy control information (CCI), and a source of the content and other data). The ECM of a movie has the form: E_{GPK}(CW, never-copy). *See, specification, page 8, line 39.* Thus, the control word and never-copy indicative data are encrypted using a global public key. When a recorder receives this ECM, it transforms it to: E_{GPK} [E_{GPK}(CW, never-copy), copy-mark)]. *See, specification, page 8, line 40 – page 9, line 1.* Thus, the receiver attached copy indicative data (copy-mark) to the already encrypted ECM (E_{GPK}(CW, never-copy), and encrypted both using the global public key.

Thus, a received ECM E_{GPK}(CW, never-copy) is again encrypted along with a data item to generate a nested control component E_{GPK} [E_{GPK}(CW, never-copy), copy-mark)]. The received ECM remains intact, and is fit or placed into some thing else; namely for the received ECM E_{GPK}(CW, never-copy), E_{GPK} [... , copy-mark)]. The movie with this nested ECM will be the output of the recording process. *See, specification, page 9, lines 1-2.* Accordingly, the received encrypted control component (ECM) is nested within another encryption level with a data item to generate a nested control component. In contrast, the cited art of record fails to teach or even suggest, the nesting approach encompassed by present claim 1.

B. Park '559 in view of Park '826

The Final Office action acknowledges that Park '559 does not teach encrypting an already encrypted control component and data item to generate a nested control component.

See, 6/3/2005 Final Office action, page 4, lines 6-7. The Final Office action instead attempts to incorporate select portions of Park '826 to remedy this admitted shortcoming of Park '559. More particularly, the Final Office action argues Park '826 teaches generating a nested control component. *See, 6/3/2005 Office action, pars. 17, 18.* Applicant traverses this assertion.

Park '826 does not teach, or suggest, encrypting an already encrypted control component together with a data item, in a nested fashion, to generate a nested control component. Instead, Park '826 merely encrypts an unencrypted control word (i.e. scrambling key) along with an updatable value (i.e. additional information) where, upon decryption of the encrypted scrambling key and the updatable value (see FIG. 8 of Park '826), the value itself is updated (i.e. decremented) and then recorded onto a video tape. Thus, instead of nesting encrypted control components, Park '826 merely teaches extracting and updating a value.

More particularly, Park '826 discloses an encrypting portion 10 (Fig. 7, column 4, line 46), in which information containing a reproducible number is encrypted together with a scrambling key. *See, e.g., Park '826, Col. 6, lines 62 - 64.* However, this additional information and scrambling key are in no way encrypted so as to generate a nested control component as is expressly recited in Claim 1. In contrast, a detailed reading of column 2, lines 53-60 of Park '826 reveals:

> In playback of video tape, a decryption algorithm corresponding to the encryption algorithm is used to restore a scrambling key and information on a reproducible number remaining. Using the restored scrambling key, the original bit stream is restored through descrambling. Here, the reproducible number remaining is reduced by one and then recorded on video tape. (emphasis added).

Column 6, lines 62-65 of Park '826 further reveals:

> "In encrypting portion 10, the additional information containing the reproducible number is encrypted together with the scrambling key. In Decrypting portion 20, the additional information is updated for every playback". (emphasis added).

From these passages, it is clear that Park '826 does not generate a nested control component as recited in the present claims – but instead merely encrypts a control word or scrambling key along with an updatable value (i.e., the additional information). The scrambling key is then decrypted by decrypting portion 20 (Fig. 8), as is the updatable value, which is then modified (i.e. decremented) and recorded onto the video tape for each playback.

The prior art teaching of updating, e.g., modifying, a value, is not analogous to the presently claimed attaching and encrypting to generate a nested control component. Updating merely provides an output having the same number of levels with a new value therein (e.g., an n level input with value x provides an n level output with value x'). In contradistinction, in the present invention an already encrypted control component has data attached thereto, and the combination is again encrypted to provide a nested control component having n+1 levels.

The Final Office action further relies upon col. 6, lines 53-67 of Park '826 as allegedly supporting the argument that Park '826 teaches a nested control component. This passage is reproduced below and recites:

> Data is protected in two levels, that is, a scrambling level using scrambler and descrambler 30 and 40, and an encryption level using the encryption means of FIG. 7 and the decryption means of FIG. 8.
>
> Specifically, the input bit stream is scrambled in scrambler 30, and the scrambling key used in scrambling is encrypted. Here, the scrambling key uses the output of random key generator 50, and is thus not stored. In order to find out the scrambling key, the encrypted scrambling key must be decrypted, ensuring high security.
>
> In encrypting portion 10, the additional information containing the reproducible number is encrypted together

> with the scrambling key. In Decrypting portion 20, the additional information is updated for every playback. In case the additional information satisfies a predetermined condition, the scrambling key is supposed to be destroyed. (emphasis added).

Thus, contrary to the assertions of the Final Office action, this passage simply reinforces that Park '826 merely updates, i.e., changes, a value – and does not attach a data item to an encrypted control component, nor encrypt the combination thereof to generate a nested control component as is recited by Claim 1.

The Final Office action also relies upon col. 4, line 46 – col. 5, line 17 of Park '826 as supporting its assertion that Park '826 teaches a nested control component. Applicant traverses this assertion as well. Col. 4, line 46 – col. 5, line 15 of Park '826 merely discuss encryption/decryption methodology that uses exclusive-or functionality. Col. 5, lines 15-17 recite:

> The decryption algorithm must perform two functions, that is, restoration of plaintext and updating of additional information. (emphasis added)

This passage further clarifies the distinction that Park '826 merely updates, i.e., changes, a value – and does not attach a data item to an encrypted control component, and encrypt the combination thereof to generate a nested control component as is recited by Claim 1. This is made even more clear in the un-cited passages immediately following the relied upon portion of Park '826, which recites:

> For this, the algorithm has two portions of obtaining m and $w^{(i)}$ and updating $w^{(i)}$. This is formed by key storage 1, matrix multiplier 21, ECC decoder 22 and additional information updating portion 23, as shown in FIG. 8. $b^{(i)}$ is obtained from scrambling key vector $d^{(i)}$ encrypted in matrix multiplier 21. m and $w^{(i)}$ extracted from $b^{(i)}$ through ECC decoder 22.
>
> ECC decoder 22 uses a conventional ECC decoding algorithm. Restored m is used to descramble the bit streams in the descrambler. $w^{(i)}$ is used to update $d^{(i)}$ to $d^{(i+1)}$ in

> additional information updating portion 23. *col. 5, lines 18-28.*

Thus, Park '826 merely teaches replacing or recording over a previous copy marker with a current copy marker, and not encrypting the combination of an already encrypted control component and data item to generate a nested control component as is recited by Claim 1.

Accordingly, as Park '559 and Park '826 each fail to teach or suggest the recited "encrypting said encrypted control component and said data item to generate a nested control component" of Claim 1, clearly their combination also fails to teach or suggest such a feature. In view of the foregoing, Applicant respectfully requests reconsideration and withdrawal of this 35 USC 103 rejection of Claim 1 over Park '559 in view of Park '826.

III. Claims 2-11

A. Generally

Applicant also requests reversal of the rejections of Claims 2-11 as well, at least by virtue of their ultimate dependency upon a patentably distinct base Claim 1.

B. Claim 4

Further, Claim 4 recites that the copy control information indicates one of never-copy state and copy-once state. The Final Office action argues Park '826 teaches these states in col. 3, lines 1-4 thereof. Applicant traverses this assertion.

Col. 3, lines 1-4 merely recite

1) encrypting additional information as well as a plaintext;
2) updating the additional information from a ciphertext

Accordingly, Applicant submits this passage of Park '826 further reinforces the notion that Park '826 updates, e.g., changes, a value – and does not attach a data item to an encrypted control component, and encrypt the combination thereof to generate a nested control component as is recited by Claim 1. Further, the cited reference is totally devoid of any

teachings regarding the never-copy and copy-once states recited by Claim 4. For this additional reason, withdrawal of this rejection is respectfully urged.

VIII CONCLUSION

Claims 1-11 broadly encompass: (a) receiving a program having scrambled content and an encrypted control component; (b) attaching a data item indicating that the program has been copied to the encrypted control component; (c) encrypting the already encrypted control component and attached data item to generate a nested control component; and (d) recording the program content and nested control component. In contradistinction, the Park '559 and '826 patents, both singularly, and in combination, fail to teach or suggest at least the limitations of (1) attaching a data item to a received program's encrypted control component, the data item indicating that the program has been copied; (2) encrypting the encrypted control component and data item to generate a nested control component; nor the further limitation of recording said nested control component.

Accordingly, the cited art of record clearly fails to teach the claimed method and thus fails to render Claim 1 unpatentable. All of Claims 2-11 ultimately depend from Claim 1. In view of the foregoing, it is respectfully submitted that the rejection of Claims 1-11 should be reversed.

Respectfully submitted,
Eskicioglu, et al.

By: Paul P. Kiel
Attorney for Applicants
Registration No. 40,677

APPENDIX I - APPEALED CLAIMS

1. (ORIGINAL) A method for copying a program having a scrambled program content component and an encrypted control component comprising:

(a) receiving, in a recording apparatus, said program;

(b) attaching a data item to said encrypted control component, said data item indicating that said program has been copied;

(c) encrypting said encrypted control component and said data item to generate a nested control component; and

(d) recording said program content component and said nested control component.

2. (ORIGINAL) The method of Claim 1 wherein the steps of receiving, attaching and encrypting are performed in a smart card coupled to said recording apparatus.

3. (ORIGINAL) The method of Claim 2 wherein said encrypted control component comprises copy control information, a descrambling key associated with said scrambled program content component.

4. (ORIGINAL) The method of Claim 3 wherein said copy control information indicates one of never-copy state and copy-once state.

5. (ORIGINAL) The method of Claim 4 wherein said encrypted control component is encrypted using a global public key.

6. (ORIGINAL) The method of Claim 5 wherein said nested control component is encrypted using said global public key.

7. (ORIGINAL) The method of Claim 6 wherein said global public key is associated with said smart card, said smart card having a corresponding private key stored therein.

8. (ORIGINAL) The method of Claim 7 wherein said encrypted control component further comprises purchase information comprising channel identification data, event identity data, date and time stamp data, and billing data.

9. (ORIGINAL) The method of Claim 8 wherein said smart card comprises a card body with a plurality of terminals arranged on a surface of said card body in accordance with one of ISO 7816 and PCMCIA card standards.

10. (ORIGINAL) The method of Claim 9 wherein said recording apparatus is a digital video cassette recorder.

11. (PREVIOUSLY PRESENTED) The method of Claim 9 wherein said recording apparatus is a recordable DVD apparatus.

12 – 20 (CANCELLED)

APPENDIX II - EVIDENCE

Random House Dictionary Definitions of "nest" and "nested"

Online definition of "nested"

APPENDIX III - RELATED PROCEEDINGS

None

APPENDIX IV - TABLE OF CASES

In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)

In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)

APPENDIX V - LIST OF REFERENCES

U.S. Pat. No.	Issued Date	Inventor
5,689,559	11/18/1997	Park
5,796,826	08/18/1998	Park
5,544,246	08/06/1996	Mandelbaum et al.

APPENDIX VI - CONTEMPORANEOUSLY FILED AMENDMENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Eskicioglu
Serial No.	:	09/763,773
Filed	:	February 26, 2001
For	:	A COPY PROTECTION SYSTEM FOR HOME NETWORKS
Examiner	:	Wu, Allen S.
Art Unit	:	2135

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AFTER NOTICE OF APPEAL

Dear Sir:

A Notice of Appeal for the subject application was filed on November 2, 2005. An Appeal Brief is being filed contemporaneously herewith. Accordingly, the present Amendment is deemed to be timely filed. Should there be any fees due and owing with respect to this amendment, the Office is authorized to charge such fees to Deposit Account No. 50-3208.

Amendments to the Claims are reflected in the listing of Claims that begins on page 2 of this paper.

Remarks/Arguments begin on page 3 of this paper.

Certificate of Mailing under 37 CFR 1.10

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to Mail Stop Appeal Brief - Patents, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450

April 4, 2006
Date

Lori Klewin
Lori Klewin

In the Claims:

Please amend the Claims as follows and without prejudice. This listing of Claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (ORIGINAL) A method for copying a program having a scrambled program content component and an encrypted control component comprising:

(a) receiving, in a recording apparatus, said program;

(b) attaching a data item to said encrypted control component, said data item indicating that said program has been copied;

(c) encrypting said encrypted control component and said data item to generate a nested control component; and

(d) recording said program content component and said nested control component.

2. (ORIGINAL) The method of Claim 1 wherein the steps of receiving, attaching and encrypting are performed in a smart card coupled to said recording apparatus.

3. (ORIGINAL) The method of Claim 2 wherein said encrypted control component comprises copy control information, a descrambling key associated with said scrambled program content component.

4. (ORIGINAL) The method of Claim 3 wherein said copy control information indicates one of never-copy state and copy-once state.

5. (ORIGINAL) The method of Claim 4 wherein said encrypted control component is encrypted using a global public key.

6. (ORIGINAL) The method of Claim 5 wherein said nested control component is encrypted using said global public key.

7. (ORIGINAL) The method of Claim 6 wherein said global public key is associated with said smart card, said smart card having a corresponding private key stored therein.

8. (ORIGINAL) The method of Claim 7 wherein said encrypted control component further comprises purchase information comprising channel identification data, event identity data, date and time stamp data, and billing data.

9. (ORIGINAL) The method of Claim 8 wherein said smart card comprises a card body with a plurality of terminals arranged on a surface of said card body in accordance with one of ISO 7816 and PCMCIA card standards.

10. (ORIGINAL) The method of Claim 9 wherein said recording apparatus is a digital video cassette recorder.

11. (PREVIOUSLY PRESENTED) The method of Claim 9 wherein said recording apparatus is a recordable DVD apparatus.

12 – 20 (CANCELLED)

STATUS OF CLAIMS

Claims 1 - 20 are pending.

Claims 1 – 20 stand rejected.

Claims 12 - 20 have been cancelled without prejudice.

REMARKS

By this amendment, Applicant cancels Claims 12 – 20 without prejudice solely for the non-limiting purpose of simplifying the issues for appeal, and subject to Applicant's right to re-introduce and seek further prosecution of these now cancelled claims in a related application. Entry of this amendment is respectfully requested.

Should there be any questions or outstanding matters, the Examiner is cordially invited and requested to contact Applicant's undersigned attorney at 609-734-6815.

Respectfully submitted,
Eskicioglu, et al.

By: Paul P. Kiel
Attorney for Applicants
Registration No. 40,677

Date 4/4/06
c/o THOMSON LICENSING INC.
Patent Operations
CN 5312
Princeton, NJ 08543-0028

TABLE OF CONTENTS

Attachment "A"

THE RANDOM HOUSE DICTIONARY of the ENGLISH LANGUAGE

JESS STEIN
Editor in Chief

LAURENCE URDANG
Managing Editor

PUBLISHED IN NEW YORK BY RANDOM HOUSE, INC.
AND SIMULTANEOUSLY IN TORONTO BY RANDOM HOUSE OF CANADA LIMITED

a. s/mm-n

Library of Congress Catalog Card Number: 67-12237

Manufactured in the United States of America

for ammonia by means of Nessler's reagent. —*v.t.* 2. to use Nessler's reagent as a test for ammonia in water or other liquids. [named after Julius *Nessler* (1827–1905), German chemist; see -IZE]

Ness/ler's rea/gent (nes/lərz), an aqueous solution of potassium iodide, mercuric chloride, and potassium hydroxide, used as a test for the presence of ammonia. Also called Ness/ler's solu/tion.

Nes·sus (nes/əs), *n. Class. Myth.* a centaur who, on attempting to seduce Deianira, the wife of Hercules, was shot by Hercules with a poisoned arrow. Before Nessus died, he gave to Deianira the poisoned tunic that ultimately caused Hercules' death.

nest (nest), *n.* 1. a pocketlike, usually more or less circular structure of twigs, grass, mud, etc., formed by a bird, often high in a tree, as a place in which to lay and incubate its eggs and rear its young; any protected place used by a bird for these purposes. 2. a place used by insects, fishes, turtles, rabbits, or the like, for depositing their eggs or young. 3. a number of birds or animals inhabiting one such place. 4. a snug retreat or refuge; resting place. 5. an assemblage of things lying or set close together, as a series of boxes, trays, etc., that fit within each other: *a nest of tables.* 6. a place where something bad is fostered or flourishes: *a nest of vice; a robber's nest.* 7. the occupants or frequenters of such a place. —*v.i.* 8. to settle or place (something) in or as if in a nest: *to nest dishes in excelsior.* 9. to fit or place one within another: *to nest boxes for more compact storage.* —*v.i.* 10. to build or have a nest: *The swallows nested under the eaves.* 11. to settle in or as in a nest. 12. to fit together or within another or one another: *bowls that nest easily for storage.* 13. to search for or collect nests: *to go nesting.* [ME, OE, c. D, G *nest;* akin to L *nīdus* nest, Skt *nīda* lair. Basic meaning: sitting-place; see NETHER, SIT] —**nest/a·ble,** *adj.* —**nest/er,** *n.* —**nest/like/,** *adj.* —**nest/y,** *adj.*

n'est-ce pas (nes pä/), *French.* isn't that so?

nest·ed (nes/tid), *adj. Math.* (of an ordered collection of sets or intervals) having the property that each set is contained in the preceding set and the length or diameter of the sets approaches zero as the number of sets tends to infinity. [NEST + -ED²]

nest/ egg/, 1. a natural or artificial egg left in a nest to induce a hen to continue laying eggs there. 2. money saved and held in reserve for emergencies, retirement, etc.

nes·tle (nes/əl), *v.*, **-tled, -tling.** —*v.i.* 1. to lie close and snug, like a bird in a nest; snuggle or cuddle. 2. to lie or be located in a sheltered spot; be naturally or pleasantly situated: *a cottage nestling in a pine grove.* 3. *Archaic.* a. to make or have a nest. b. to make one's home; settle in a home. —*v.t.* 4. to provide with or settle in a nest, as a bird. 5. to settle or ensconce snugly: *He nestled himself into the hay for a short nap.* 6. to put or press confidingly or affectionately: *She nestled her head on his shoulder.* [ME *nestle(n),* OE *nestlian,* c. D *nestelen.* See NEST, -LE] —**nes/tler,** *n.*

nest·ling (nest/ling, nes/ling), *n.* 1. a young bird not yet old enough to leave the nest. 2. a young child. [ME; see NEST, -LING¹]

nest/ of drawers/, a miniature chest of drawers made in the 18th century.

Nes·tor (nes/tər), *n. Class. Myth.* the wisest and oldest of the Greeks in the Trojan War.

Nes·to·ri·an (ne stôr/ē ən, -stōr/-), *n.* one of a sect of Christians, followers of Nestorius, who denied the hypostatic union and were represented as maintaining the existence of two distinct persons in Christ. [< LL *Nestorīān(us).* See NESTORIUS, -AN] —**Nes·to/ri·an·ism,** *n.*

Nes·to·ri·us (ne stôr/ē əs, -stōr/-), *n.* died A.D. 451?, Syrian ecclesiastic: patriarch of Constantinople 428–431.

net¹ (net), *n., v.*, **net·ted, net·ting.** —*n.* 1. a lacelike fabric with a uniform mesh of cotton, silk, rayon, nylon, etc., often forming the foundation of any of various laces. 2. a piece of meshed fabric designed to serve a specific purpose, as to divide a court in racket games or protect against insects: *a tennis net; a mosquito net.* 3. a bag or other contrivance of strong thread or cord worked into an open, meshed fabric, for catching fish, birds, or other animals: *a butterfly net.* 4. anything serving to catch or ensnare: *a police net to trap the bank robber.* 5. any network or reticulated system of filaments, lines, veins, or the like. 6. (*cap.*) *Astron.* the constellation Reticulum. 7. (in tennis, badminton, etc.) a ball that hits the net. 8. *Math.* the abstraction, in topology, of a sequence; a map from a directed set to a given space. 9. Often, **nets.** the goal in hockey or lacrosse. 10. *Informal.* a radio or television network. —*v.t.* 11. to cover, screen, or enclose with a net or netting: *netting the bed to keep out mosquitoes.* 12. to take with a net: *to net fish.* 13. to set or use nets in (a river, stream, etc.), as for catching fish. 14. to catch or ensnare: *to net a dangerous criminal.* 15. (in tennis, badminton, etc.) to hit (the ball) into the net. [ME *nett(le),* OE *nett(t),* c. D, Icel *net,* Goth *nati,* G *Netz*] —**net/ta·ble,** *adj.* —**net/like/,** *adj.*

net² (net), *adj., n., v.*, **net·ted, net·ting.** —*adj.* 1. remaining after deductions, as for charges, expenses, etc. (opposed to *gross*): *net earnings.* 2. (of weight) after deduction of tare, tret, or both. 3. sold at a stated price with all parts and charges included and with all deductions having been made. 4. final; totally conclusive: *After all that work, what was the net result?* —*n.* 5. net income, profit, or the like. —*v.t.* 6. to gain or produce as clear profit. [var. of NEAT¹] —**net/ta·ble,** *adj.*

net·ball (net/bôl/), *n. Brit.* a game similar to basketball, played with a soccer ball, usually outdoors. [NET¹ + BALL]

net/ blotch/, *Plant Pathol.* a disease of grasses, characterized by a brown, netlike discoloration of the leaves, caused by fungi of the genus *Heiminthosporium.*

Net·cong (net/kông, -kong), *n.* a town in N New Jersey. 2765 (1960).

Ne Te·me·re (nā tem/ə rē/), *Rom. Cath. Ch.* a legislative decree, in effect since 1908, declaring that a marriage of a baptized or lapsed Roman Catholic of the Latin rite is invalid unless celebrated before a

neothera, nithera, deriv. of *nither* down (c. G *nieder*), lit., further down, equiv. to *ni-* down + *-ither* comp. suffix] —**neth/er·ward,** *adj.*

Neth·er·lands (neth/ər ləndz), *n.* the, (*construed as sing. or pl.*) a kingdom in W Europe, bordering on the North Sea, West Germany, and Belgium. 11,417,254 (est. 1960); 13,433 sq. mi. *Capitals:* Amsterdam *and* (est. 1960); 13,433 sq. mi. *Capitals:* Amsterdam *and* The Hague. Also called **Holland.** —**Neth·er·land·er** (neth/ər lan/dər), *n.* —**Neth/er·land/i·an, Neth/er·land/ic,** *adj.*

Neth/erlands Antil/les, a Netherlands overseas territory in the Caribbean Sea, N and NE of Venezuela; includes the islands of Aruba, Bonaire, Curaçao, Saba, and St. Eustatius, and the S part of St. Martin; considered an integral part of the Dutch realm. 187,234 (1960); 366 sq. mi. *Cap.:* Willemstad. Also called Curaçao. Formerly, **Neth/erlands West/ In/dies, Dutch West Indies.**

Neth/erlands East/ In/dies, a former name of the Republic of Indonesia.

Neth/erlands Guian/a, Surinam.

Neth/erlands New/ Guin/ea, a former name of West Irian.

Neth/erlands Ti/mor, a former name of Indonesian Timor.

neth·er·most (neth/ər mōst/, -məst), *adj.* lowest: *the nethermost depths of the ocean.* [ME *nethermast.* See NETHER, -MOST]

neth/er world/, 1. the infernal regions; hell. 2. the afterworld, or hereafter.

Né·thou (*Fr.* nā tōō/), *n.* Pic de (*Fr.* pēk də), a mountain in NE Spain: highest peak of the Pyrenees. 11,165 ft. Spanish, **Pico de Aneto.**

ne·ti ne·ti (nā/ti nā/ti), *Sanskrit.* neither this nor that (used in Hinduism to describe the undifferentiated and ineffable nature of Brahman).

net/ line/. See **neat line.**

net·man (net/man/, -mən), *n., pl.* **-men** (-men/, -mən). 1. a tennis player. 2. *Tennis.* the partner in a doubles game who stands near the net in the forward part of the court. [NET¹ + MAN¹]

net/ na/tional prod/uct, the gross national product less allowance for depreciation of capital goods. *Abbr.:* NNP Cf. **national income.**

net/ prof/it, the actual profit made on a business transaction, sale, etc., or during a specific period of business activity, after deducting all costs from gross receipts.

net/ reg/ister ton. See **net ton** (def. 1).

net/ reg/ister ton/nage. See **net tonnage.**

net/ silk/, *Chiefly Brit.* See **thrown silk.**

ne·tsu·ke (net/skē, -skā; *Jap.* ne/tsōō ke/), *n.* (in Japanese art) a small figure of ivory, wood, metal, or ceramic, originally used as a buttonlike fixture on a man's sash, from which small personal belongings were hung. [< Jap]

net/ted mel/on, a variety of muskmelon, *Cucumis Melo reticulatus,* having reticulate markings on the skin and green to reddish-orange flesh. Also called **nutmeg melon.**

Net·tie (net/ē), *n.* a girl's given name, Scottish form of **Janet.** Also, **Net·ta** (net/ə), **Net/ty.**

net·ting (net/iŋ), *n.* any of various kinds of net fabric: *fish netting; mosquito netting.* [NET¹ + -ING¹]

net/ting knot/. See **sheet bend.**

net·tle (net/əl), *n., v.*, **-tled, -tling.** —*n.* 1. any herb of the genus *Urtica,* covered with stinging hairs. 2. any of various allied or similar plants. —*v.t.* 3. to irritate or provoke. 4. to sting as a nettle does. [ME; OE *netele,* c. D *netel,* Norw *netla,* G *Nessel*] —**net/tle·like/,** *adj.* —**net/tler,** *n.* —**net/tly,** *adj.*

net/tle cell/, *Zool.* a nematocyst.

net·tle·fish (net/əl fish/), *n., pl.* (*esp. collectively*) **-fish,** (*esp. referring to two or more kinds or species*) **-fish·es.** jellyfish. [NETTLE + FISH]

net/tle rash/, *Pathol.* urticaria resulting from contact with various plants causing local irritation.

net·tle·some (net/əl səm), *adj.* 1. causing irritation, vexation, or annoyance: *to cope with a nettlesome situation.* 2. easily provoked or annoyed: *to become nettlesome over trifles.* [NETTLE + -SOME¹]

net/ ton/, 1. Also called **net register ton.** *Naut.* one gross ton registered as taxable. 2. See **short ton.**

net/ ton/nage, the taxable gross tonnage of a merchant ship. Also called **net register tonnage.**

net·work (net/wûrk/), *n.* 1. any netlike combination of filaments, lines, veins, passages, or the like: *a network of arteries; a network of sewers under the city.* 2. a system of interrelated buildings, offices, stations, etc., esp. over a large area or throughout a country, territory, region, etc.: *a network of supply depots.* 3. a netting or net. 4. *Radio, Television.* a group of transmitting stations linked by wire or microwave relay so that the same program can be broadcast or telecast by all. 5. *Elect.* an arrangement of conducting elements, as resistors, capacitors, inductors, etc., connected by conducting wire. [NET¹ + WORK]

Neu·châ·tel (*Fr.* nœ shä tel/), *n.* 1. a canton in W Switzerland. 147,683 (1960); 309 sq. mi. 2. the capital of this canton, on the Lake of Neuchâtel. 33,430 (1960). 3. Lake of, a lake in W Switzerland. 85 sq. mi. German, **Neu·en·burg** (noi/ən bo͝orkh/).

Neu·e Sach·lich·keit (noi/ə zäkh/likh kīt/), *German.* a group of German painters of the 1920's whose works were characterized chiefly by sharply detailed renderings of representational forms. [lit., new objectivity]

Neuf·châ·tel (nōō/shə tel/, nōō/shə tel/; *Fr.* nœ shä tel/), *n.* a soft, white cheese similar to cream cheese, made from whole or partly skimmed milk in Neufchâtel, a town in N France. Also called **Neuf/châtel cheese/.**

Neuil·ly (nœ yē/), *n.* a suburb of Paris, in N France: treaty of peace (1919) between the Allies and Bulgaria. 73,315 (1962). Also called **Neuil·ly-sur-Seine** (nœ yē syr sen/).

neuk (nyo͝ok), *n. Scot.* nook.

Neu·may·er (noi/mī ər, nyo͝o/-), *n.* a walled plain in the fourth

tion of the Middle Ages, but now employed sole notating Gregorian chant in the liturgical books Roman Catholic Church. [late ME < ML *neu* Gk *pneuma* breath] —**neu·mat·ic** (no͞o mat/ik, n **neu/mic,** *adj.*

Neu·pest (noi/pest/), *n.* German name of Ujpes

Ne·u·quén (ne/o͞o ken/), *n.* a city in central A tina. 14,000 (est. 1965).

neur-, var. of **neuro-** before a vowel: *neuritis.*

neu·ral (no͝or/əl, nyo͝or/-), *adj.* of or pertainin nerve or the nervous system. [NEUR- + -AL¹] — **ral·ly,** *adv.*

neu·ral·gia (no͝o ral/jə, nyo͝o-), *n. Pathol.* sha paroxysmal pain along the course of a nerve. [+ -ALGIA] —**neu·ral/gic,** *adj.*

neu·ral·gi·form (no͝o ral/jə fôrm/, nyo͝o-), *adj. ol.* resembling neuralgia. [NEURALGI(A) + -FORM

neu/ra·min/ic ac/id (no͝or/ə min/ik, nyo͝or/-, nyo͝or/-), *Biochem.* an amino comp $C_9H_{17}NO_8$, that occurs in all animal tissues and is c with other compounds as part of the carbohy protein complexes. [NEUR- + AMINE + -IC]

neu·ras·the·ni·a (no͝or/əs thē/nē ə, nyo͝or/-, nyo͝or/-), *Pathol.* nervous debility and exhaustion, as from work or prolonged mental strain, characterized by complaints of a physical nature in the absence jectively present causes or lesions; nervous prost nervous breakdown. [NEUR- + ASTHENIA]

neu·ras·then·ic (no͝or/əs then/ik, nyo͝or/-), —*adj.* 1. pertaining to or suffering from neuras —*n.* 2. a person suffering from neurasthenia. RASTHEN(IA) + -IC] —**neu/ras·then/i·cal·ly,** *ad*

neu·ra·tion (no͝o rā/shən, nyo͝o-), *n.* ve [NEUR- + -ATION]

neu·rax·i·tis (no͝or/ak sī/tis, nyo͝or/-), *n. Pa* inflammation of an axon. 2. encephalitis. + AX(IS)¹ + -ITIS]

neu·rec·to·my (no͝o rek/tə mē, nyo͝o-), *n., pl. Surg.* the removal of part or all of a nerve. [NE -ECTOMY]

neu·ri·dine (no͝or/i dēn/, -din, nyo͝or/-), *n.* B spermine. [NEUR- + -ID³ + -INE²]

neu·ri·lem·ma (no͝or/ə lem/ə, nyo͝or/-), *n.* the delicate, membranous sheath of a nerve [alter. of F *neurilème* (< Gk *neur-* NEUR- + covering), by assoc. with LEMMA²] —**neu/ri·le neu·ri·lem·mat·ic** (no͝or/ə li mat/ik, nyo͝or/-), ri·lem·ma·tous (no͝or/ə lem/ə təs, nyo͝or/-), *adj.*

neu·rite (no͝or/īt, nyo͝or/-), *n. Anat.* axon. + -ITE¹]

neu·ri·tis (no͝o ri/tis, nyo͝o-), *n. Pathol.* 1. mation of a nerve. 2. continuous pain in a associated with paralysis and sensory distur [NEUR- + -ITIS] —**neu·rit·ic** (no͝o rit/ik, nyo͝o-)

neuro-, a learned borrowing from Greek use the meaning "nerve," "sinew," "tendon," in the tion of compound words: *neurology.* Also, *esp. a vowel,* **neur-.** [< Gk *neuro-,* comb. form of akin to L *nervus*]

neu·ro·a·nat·o·mist (no͝or/ō ə nat/ə mist, nyo͝o *n.* a specialist in neuroanatomy. [NEUROANATO -IST]

neu·ro·a·nat·o·my (no͝or/ō ə nat/ə mē, nyo͝o *pl.* **-mies.** 1. the branch of anatomy dealing w nervous system. 2. the nerve structure of ma animal, or of any of the parts of an organism. [+ ANATOMY] —**neu·ro·an·a·tom·i·cal** (no͝or tom/i kəl, nyo͝or/-), **neu/ro·an/a·tom/ic,** *adj.*

neu·ro·blast (no͝or/ə blast/, nyo͝or/-), *n.* one of the cells in the embryonic brain and spin of vertebrates, which develop into nerve cells. [+ -BLAST] —**neu·ro·blas/tic,** *adj.*

neu·ro·cir·cu·la·to·ry asthe·nia (no͝or/ō sə lə tôr/ē, -tōr/ē, nyo͝or/-), *Pathol.* See **cardiac ne** [NEURO- + CIRCULATORY]

neu·ro·coele (no͝or/ə sēl/, nyo͝or/-), *n. Embr* system of cavities of the embryonic brain an cord. Also, **neu/ro·coel/, neu/ro·cele/.** [NE -COELE] —**neu/ro·coel/i·an, neu/ro·cel/i·an,** *a*

neu·ro·em·bry·ol·o·gy (no͝or/ō em/brē nyo͝or/-), *n.* the branch of embryology deali the origin and development of the nervous [NEURO- + EMBRYOLOGY] —**neu·ro·em·bry·o·** (no͝or/ō em/brē ə loj/i kəl, nyo͝or/-), **neu/ro·em** log/ic, *adj.* —**neu/ro·em/bry·ol/o·gist,** *n.*

neu·ro·fi·bril (no͝or/ō fī/bril, nyo͝or/-), *n.* fibril of a nerve cell. [NEURO- + FIBRIL] — fi/bri·lar, *adj.*

neu·ro·fi·bro·ma (no͝or/ō fī brō/mə, nyo͝o *Pathol.* a benign neoplasm composed of the elements of a nerve. [NEURO- + FIBROMA]

neu·ro·gen·ic (no͝or/ə jen/ik, nyo͝or/-), *adj* originating in a nerve or nerve tissue. Also, **ne** nous (no͝o roj/ə nəs, nyo͝o-). [NEURO- + GENIC

neu·rog·li·a (no͝o rog/lē ə, nyo͝o-), *n. Anat.* cate connective tissue which supports and b gether the essential elements of nerve tissu central nervous system. [NEURO- + LGk *gl* —**neu·rog/li·al, neu·rog·li·ac** (no͝o rog/lē ak/, **neu·rog/li·ar, neu·rog/lic,** *adj.*

neu·ro·gram (no͝or/ə gram/, nyo͝or/-), *n. Ps* a hypothesized alteration of the brain produce allowing the retention of experience. [NE -GRAM¹] —**neu/ro·gram/mic,** *adj.*

neu·rol·o·gist (no͝o rol/ə jist, nyo͝o-), *n.* a I specializing in neurology. [NEUROLOG(Y) + -IS

neu·rol·o·gy (no͝o rol/ə jē, nyo͝o-), *n.* the s the nerves and the nervous system, esp. of the affecting them. [< NL *neurologia.* See NEURO- —**neu·ro·log·i·cal** (no͝or/ə loj/i kəl, nyo͝or/-), *a*

neu·rol·y·sis (no͝o rol/i sis, nyo͝o-), *n. P* disintegration of nerve tissue. 2. exhaustion o by excess stimulation. [NEURO- + -LYSIS] lyt·ic (no͝or/ə lit/ik, nyo͝or/-), *adj.*

neu·ro·ma (no͝o rō/mə, nyo͝o-), *n., pl.* **-mas** (-mə təs). *Pathol.* a tumor formed of nerv [NEUR- + -OMA] —**neu·rom·a·tous** (no͝o r nyo͝o-) *adj.*

Attachment "B"

Whatis?com

The leading IT encyclopedia and learning center

Whatis.com *Target Search™*

Search our IT-specific encyclopedia for:

Search or jump to a topic: Choose a topic... Go

Advanced Search

Browse alphabetically:

A B C D E F G H I J K L M **N** O P Q R S T U V W X Y Z #

nested

In general, something that is nested is fully contained within something else of the same kind. In programming, nested describes code that performs a particular function and that is contained within code that performs a broader function. One well-known example is the procedure known as the *nested do-loop*. In data structures, data organizations that are separately identifiable but also part of a larger data organization are said to be nested within the larger organization. A table within a table is a nested table. A list within a list is a nested list.

A common alternative to nested is the prefix *sub*, as in subprocedure, substructure, subtransaction, and so forth.

WHATIS RELATED LINKS

Ads by Google

Great XML Tutorial
Learn XML, DTD, Schema, XSLT, Soap Get hands-on experience!
www.Altova.com

Word Definitions
Look up dictionary terms instantly! Free reference dictionary toolbar.
www.StarWare.com

Attachment "C"

MODERN DIGITAL DESIGN

Richard S. Sandige

This book was set in Times Roman by Publication Services.
The editors were Alar E. Elken and John M. Morriss;
the production supervisor was Friederich W. Schulte.
The cover was designed by Joseph Gillians.
Project supervision was done by Publication Services.
R. R. Donnelley & Sons Company was printer and binder.

MODERN DIGITAL DESIGN

3 4 5 6 7 8 9 0 DOC DOC 9 5 4 3 2 1

ISBN 0-07-054857-9

Library of Congress Cataloging-in-Publication Data

Sandige, Richard S.
Modern digital design / Richard S. Sandige.
p. cm.—(McGraw-Hill series in electrical engineering. Computer engineering)
Includes bibliographies and index.
ISBN 0-07-054857-9
1. Logic circuits—Design and construction. 2. Logic design.
I. Title. II. Series.
TK7868.L6S26 1990
621.39'5—dc20 89-12401

line MUX shown in

lexer is shown below.
ible, if written without

iat the 4-to-1 line MUX
K discussed earlier.
olexer can be checked by
ght side of the function,
= agrees with the output
written directly from the

Selectors can also be
ocedure is to use block
they can be connected
or example, using three
constructed as shown
time of $4t_{pd}$ compared
ultiplexer design shown

ne 4-to-1 line Multiplexer
er.

tiplexer is shown in Fig.

plexer selects each of the
r select inputs SI4 SI3 =
or select inputs SI4 SI3 =
selected, then select inputs
cted for n = 0 0 0 through

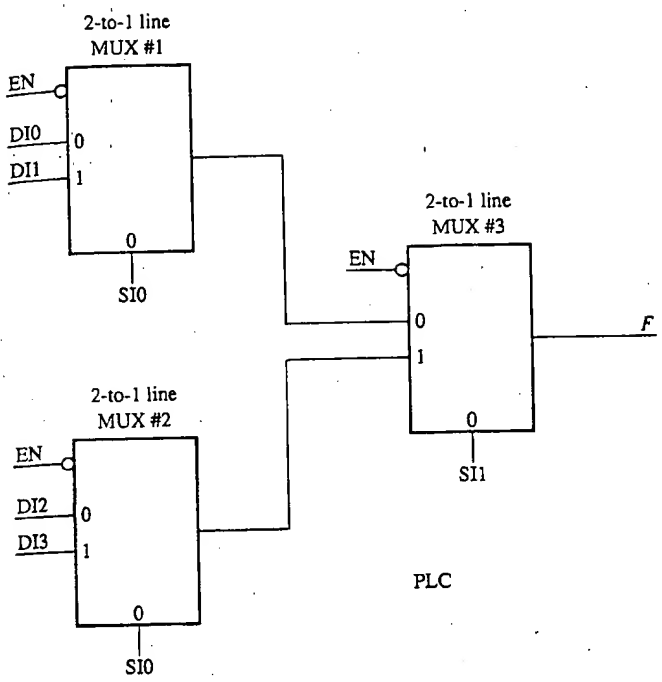

FIGURE 5-23
A 4-to-1 line Multiplexer constructed from three 2-to-1 line Multiplexers.

1 1 1 for each respective MUX. The overall data input selected is determined by concatenating the binary values for m and n.

5-5-8 Exclusive OR and Exclusive NOR

Exclusive ORs and Exclusive NORs are special two-input devices that are obtained from the definition of their respective truth table logic descriptions. The truth table description for these devices are listed as follows:

X	Y	F1
0	0	0
0	1	1
1	0	1
1	1	0

X	Y	F2
0	0	1
0	1	0
1	0	0
1	1	1

By definition, $F1$ is an Exclusive OR function, and its complement $F2$ is an Exclusive NOR function. The Karnaugh maps for $F1$ and $F2$ are shown in Fig. 5-24. Neither function can be reduced.